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A PRELIMINARY OBSERVATION ON DIVERSITY OF BUTTERFLIES OF SHIVAGANGOTRI CAMPUS, DAVANGERE UNIVERSITY DAVANGERE, KARNATAKA

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ABSTRACT

Butterflies are the most tantalizing and beautiful creatures, among the insect group, they are often regarded as flagship species, which are also indicators of ecological changes in their surroundings. Butterflies also hold great aesthetic value for humankind. Their shapes, colors, and patterns have always fascinated humans and are celebrated in art. The commercial value of butterflies has been realized in many countries located along the tropics. The present study aims towards the preliminary survey, documentation, and abundance of butterfly's species in and around Shivagangotri campus, Davangere University, Tholahunase. During the study, a total of 26 species of butterflies are recorded from the 3 sites. These species belong to the 5 families of Lepidoptera. The population of butterfly species belonging to family Nymphalidae (11 species) was found to be predominantly followed by Pieridae (9 species), Papilionidae (4 species), Lycaenidae (1 species) and Hesperiidae (1 species).

KEYWORDS: Lepidoptera, Butterfly Diversity & Davanagere

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Original Article

INTRODUCTION

Butterflies have been admired for centuries for their physical beauty and behavioral display. These colorful insects frequent open, sunny wildflower gardens, grassy fields, and orchards, feeding on nectar from flowering plants. Butterflies have a fairly clear taxonomy, and their life history and biology are well defined. Butterflies belong to the order Lepidoptera, which means scale-winged. The order Lepidoptera is the second largest order in the animal kingdom, coming under the class Insecta. Worldwide there are more than 28,000 species of butterflies, with about 80 percent found in tropical regions. The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1,504 species of butterflies.

Butterflies enable sustenance of ecosystem services through their role in pollination and serving as important food chain components. Being potential pollinating agents of their nectar plants as well as indicators of the health and quality of their host plants and the ecosystem as a whole, exploration of butterfly fauna thus becomes important in identifying and preserving potential habitats under threat. In terms of indicator organisms for biodiversity studies on butterflies are an excellent choice as they are common almost everywhere, attractive and easy to observe.

Butterflies have well known ecological preferences and quickly respond to the action of divers of change even more and faster than other well-known taxa like birds and vascular plants (Thomas et al. 2004b; Warren et al. 2001).

The number of nectar plants and the diversity of the vegetation is among the most important factors affecting the distribution and abundance of the butterfly species, (Kimmo, 2002). Thus, butterflies are still relatively common and the species richness is consequently rather high in Finnish agricultural landscapes (Kuussaari et al. 2003).

Butterflies are found all over the world and in all types of environments: hot and cold, dry and moist, at sea level and high in the mountains. Most butterfly species, however, are found in tropical areas, especially tropical rainforests. Many butterflies migrate in order to avoid adverse environmental conditions (like cold weather). Butterfly migration is not well understood.

MATERIALS AND METHODS

Study Area

Shivagangothri, the main campus of the Davangere University, is located in the area of 73 acres of land to the East of Davangere city. The University has a beautiful botanical garden with a variety of flowering plants. Davangere city is the heartland of Karnataka state, located 14 28' N latitude, 75 59' longitude and 602.5 meters (1977 ft) above sea level. Davangere lies in the maiden region on the Deccan plateau. Davangere is influenced by the local steppe climate. There is little rainfall throughout the year. The average temperature is around 25.7° C and the average annual rainfall is around 613 mm. The driest month is January with no (0 mm) rainfall. The greatest amount of precipitation occurs in the month of October, with an average of 129 mm. The warmest month is April with average temperature 29.7° C. The lowest average temperature will be seen in the month of December, which is around 22.5° C.

The present study is an attempt made to document the diversity of butterflies. A preliminary survey was conducted to identify areas with a large population of butterflies. The findings presented here are based on field survey, carried out for a period of four months from January 2016 to April 2016 in three different sites of Shivagangothri campus.

Study Sites

All the study sites were within and around Shivagangotri campus. Each site was chosen on the basis of their contrasting vegetation types and levels of disturbance. The sites were as follows:

Study Site - I

The site –I mainly consist of Areca nut trees and Banana plantation. Besides the farm the channel that provides water. The site is surrounded by human activities in the form of agriculture, cattle grazing. The site is also rich in vegetation including *Carica papaya*, *Piper nigrum*, *Citrus* species, Common grass and shrubs such as *Lantana* and*eupatorium* are also present beside numerous others.

Study Site – II

This site is dominant with areca nut trees. Besides *Pouteriasapota, Tithecellobium dulce, Thyllanthus emblica, Psidium guagava, Mangifera indica* and herbs and shrubs.

Study Site – III

The site-III are dominant with gardening plants like, *Annona squamosa, mimosa pudica, Azardicta indica, Ocimum santum, Coleus, Aloe vera, Tridax*, and many herbs and shrubs.

METHODOLOGY

Field observations were made once in 7 days for a period of four months from January 2016 to April 2016. All observations of butterflies were done between 10:00 AM to 12:30 PM and 2:00 PM to 4:30 PM when the butterflies are more active. The survey was carried out by steadily walking along the survey routes and butterflies observed within a 10 m width along the routes, using the line transect method. This method has been extensively used to survey and monitor butterfly populations and communities (Clark et al. 2007; Lee et al. 2014). When identifying species by sight was difficult, the butterflies were caught using a net. The butterflies are very delicate in nature and hence the handling was done with extreme care, subsequently identified and released immediately at the spot of capture. The key characters used for identification were a colour pattern, wingspan, mode of flight, etc (Evans, 1932). The dead specimens, many of them not in very good condition, were kept in a butterfly collection box.

RESULTS AND DISCUSSIONS

Butterflies are one of the cute and marvelous creations of nature, which are also indicators of ecological changes in their surroundings. The present work mainly concentrated on butterflies of Shivagangothri campus.

During the sampling, a total of 26 species of butterflies are recorded from the 3 sites. These species belong to the 5 families of Lepidoptera. The population of butterfly species belonging to family Nymphalidae (11 species) was found to be predominantly followed by Papilionidae (4 species), Pieridae (9 species), Lycaenidae (1 species) and Hesperiidae (1 species).

Study Site - I

The site –I consist of areca nut farm and banana plantationin which 23 species of butterflies were recorded. A total of 302 butterflies were recorded in 3 study sites (January, February, March and April 2016). The richest butterfly species recorded in this site belongs to the family Nymphalidae (53%). *Tirumala limniace*, *Euploeacore*, *Hypolimnasmisippus* were most common butterflies observed. The least butterfly species observed in this site belongs to the Lycaenidae family (3%).

Study Site –II

The site is dominant with areca nut plantation in which 16 species of butterflies were recorded. Out of this, 52% belong to Nymphalidae. *Hypolimnas misippus*, *Euploea core, Eurema hecab* were most common butterflies observed in this site and the least observed butterfly species belonged to the family Hesperiidae (1%).

Study Site –III

The site-III mainly consists of the gardening plants. Among the 5 families recorded in the site, 65% belonged to Nymphalidae, *Hypolimnasmisippus, Acraeaviolae* were the most common butterflies in this site. And the least observed butterfly species belonged the family Papilionidae (5%).

Various species of butterflies recorded within the limits of campus surrounding area were presented (Table 1). They belong to 5 families i.e., Nymphalidae, Papilionidae, During the study period, the totals of 26 species were recorded from the all the 3 study sites. Out of 26 species of butterfly fauna, site-I representedby 23 species, site –II composed of 16 speciesand the site – III consists of 6 species respectively. Among the 5 families, high species diversity was evidenced by

Nymphalidae family (42%), followed by Pieridae (15%), Papilionidae (35%), Lycaenidae (4%) least was Hesperiidae (4%) (Figure 2).

Table 1: Butterfly Species Recorded from each Study Site in Davangere University, Shivagangothri, Davangere

Sl. No	Name of the Butterfly Species	SITE 1	SITE 2	SITE 3
1	**Nymphalidae**			
	1. Blue tiger *(Tirumala limniace)* (Cramer)	+	+	_
	2.Common sailor *(Neptis hylas)* (Linnaeus)	+	_	_
	3.Common crow *(Euploea core)* (Cramer)	+	+	_
	4. Common evening brown *(Melanitis leda)* (Linnaeus)	+	+	_
	5. Danaid egg fly (male) *(Hypolimnas misippus)* (Linnaeus)	+	+	+
	6. Danaid egg fly (female) *(Hypolimnas misippus)* (Linnaeus)	+	+	+
	7. Dark blue tiger *(Tirumala septen tirionis)* (Butler)	+	+	_
	8. Towny coster *(Acraea violae)* (Fabricius)	_	_	+
	9. Great egg fly (male) *(Hypolimnas bolina)* (Linnaeus)	+	_	_
	10. Lemon pancy *(Junonia lemonias)* (Linnaeus)	+	+	+
	11. Plain tiger *(Danaus chrysippus)* (Linnaeus)	+	+	_
	12. Stripped tiger *(Danaus genutia)* (Cramer)	+	_	_
2	**Pieridae**			
	1. Common mormon *(Papilio polytes)*(Linnaeus)	+	_	_
	2. Common rose/ Great wind mill *(Atrophaneura aristolochiae)* (Fabricius)	+	+	+
	3.Crimson rose *(Atrophaneura hectar)* (Fabricius)	+	_	_
	4.Common lime butterfly *(Papilio demoleus)* (Linnaeus)	_	+	_
3	**Papillionidae**			
	1.Mottled emigrant *(Catopsilia pyranthe)* (Linnaeus)	+	_	_
	2.One spot grass yellow *(Eurema andersoni)* (Moore)	+	+	_
	3.Chocolate grass yellow *(Eurema sari)* (Horsfield)	+	+	_
	4.Pioneer white *(Belenois aurota)* (Fabricius)	+	_	_
	5.Common red tip/crimson tip *(Colitis danae)* (Fabricius)	+	+	_
	6.White orange tip *(Ixias Marianne)* (Cramer)	+	+	_
	7.Cabbage white *(Pieris rapae)* (Linnaeus)	+	_	_
	8.Common grass yellow *(Eurema hecab)* (Linnaeus)	+	+	+
	9.Lemon emigrant *(Catopsilia Pomona)* (Fabricius)	+	_	_
4.	**Lycaenidae**			
	1. Common cerulean *Jamides celeno* (Cramer)	+	+	+
5.	**Hesperiidae**			
	1. Small branded swift *Pelopidas mathias* (Fabricius)	_	+	_

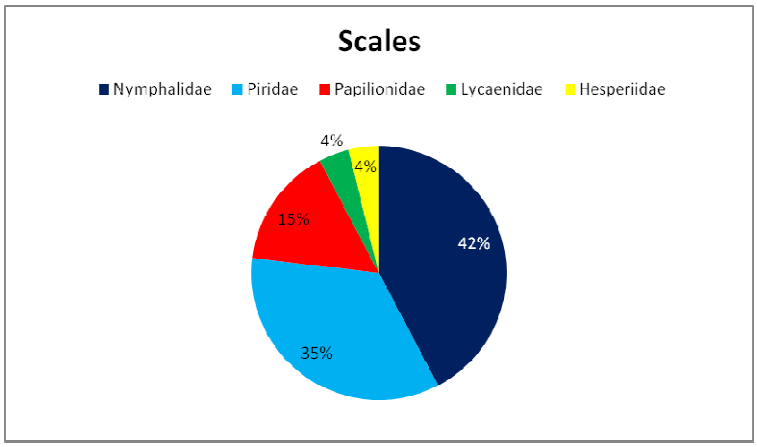

Figure 1: Family-Wise Percentage of Butterfly Species Recorded in all the Three Study Sites

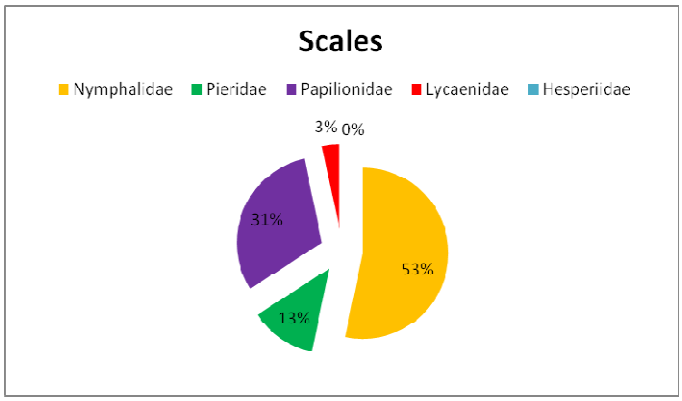

Figure 2: Percentage of Butterfly Species as per Their Families (Study Site I) in Davangere University, Shivagangothri, Davangere

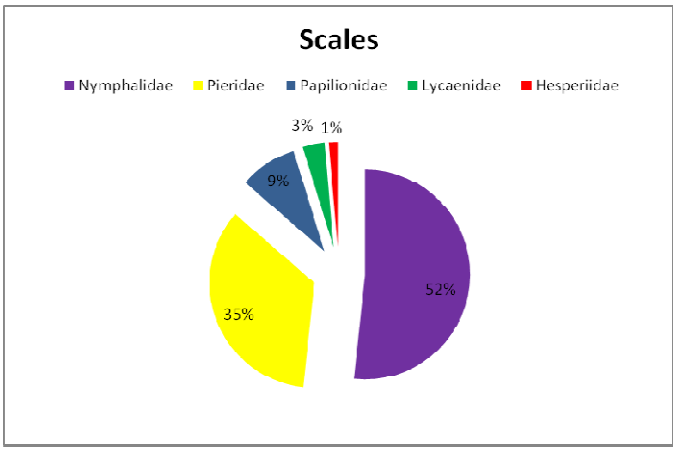

Figure 3: The Percentage of Butterfly Species as per Their Families (Study Site II) in Davangere University, Shivagangothri, Davangere

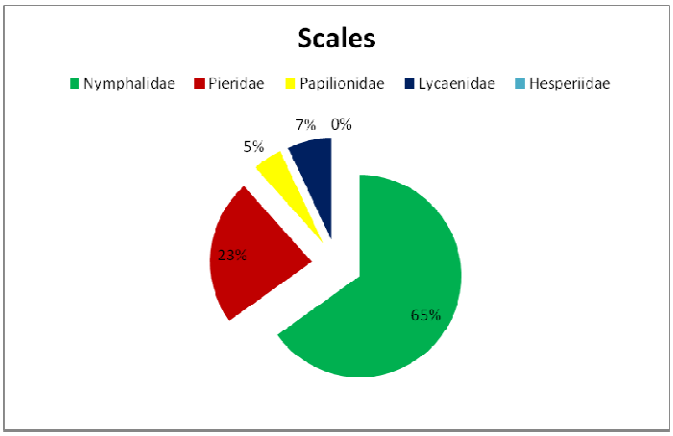

Figure 4: The Percentage of Butterfly Species as per Their Families (Study Site III) in Davangere University, Shivagangothri, Davangere

Butterflies are seasonal in their occurrence. They are common for only a few months and rare or absent in other parts of the year (Kunte, 2000). Butterflies are sensitive to the changes in the habitat and climate, which influence their distribution and abundance (Wynter-Blyth, 1957). In the present study, the number of butterfly species encountered during January to April 2016 is 26, which may be increased in winter as some species of butterflies needs a cool climate for breeding. Hence the population may increase. Though the present work was conducted during summer, still, we recorded

26 species of butterflies in the study area. Hence the site may provide a balanced environment for the species richness.

Though Nymphalidae shows dominance in species richness, Pieridae represented abundance in butterflies in all the three study sites. Earlier reports are done by Mathew, Rahamathulla (1993) also favours this result, but it was done in the silent valley national park. The reason for this extraordinary abundance of butterflies in the study sites can be ascribed by the dominance of their larval food plants in the region.

The butterflies are seemed to be more abundant in the site I than that of site II and III. The Danaid egg fly was most common in all the study site.

During the study period, Considerable variations in the abundance in butterfly distribution were noticed by month. Most of the species were recorded peak number in January month, less during April. It may be due to drying up off vegetation. Kunte (1997) reported that many butterfly species are strictly seasonal, preferring only a particular set of habitats. In the present study, it is clearly noticed that the distribution of lepidopteron related to the floral diversity as mentioned by other workers (Wynter Blyth, 1956; Kunte, 1997).

CONCLUSIONS

The present study was carried out in Davangere university campus area by selecting three study sites. The different species of butterflies were identified and recorded in all the three study sites in which the Nymphalidae family is dominant in total number of species than other.

A total of 26 species of butterflies belonging to five families were identified. The species richness and diversity of butterflies is higher in the study area. The botanical garden and growth of natural trees are the main causes of species richness and diversity of butterflies. From our observations, we conclude that the butterfly community varied significantly among different habitats. Vegetation type played a major role in diversity patterns of butterfly community.

Apart from being one of the most prominent biodiversity indicators, butterflies also act as our native gardener for their dependence on indigenous plants for completion of the life cycle. Therefore, an abundance of butterflies usually indicates a healthier ecosystem. Butterflies also serve as major pollinators of both wild and cultivated plants. Butterflies have a significant and beneficial role to play in nature for protection of all life forms including our own.

The findings of the present study underline the importance of institutional campus as a preferred habitat for butterflies. If the landscaping and maintenance of gardens are carefully planned, the diversity of butterflies may increase in our campus providing a rich ground for butterfly conservation as well as for research. This study will also add to our future attempts in understanding the complex nature of mutualistic interaction between butterflies and flowering plants that is essential for continuity of ecosystem services. Thus any studies in any habitat on butterflies are essential for the better conservation and management of ecosystem. The present list of butterfly species is not conclusive and exhaustive and future exploration will be continued to update this checklist.

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